GUIDELINES FOR LAND APPLICATION AND STORAGE OF BIOSOLIDS IN NOVA SCOTIA

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NOVA SCOTIA

Environment and Labour

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1.0 INTRODUCTION

These Guidelines pertain to land application of biosolids and the storage of biosolids at land application sites. These Guidelines have been created in response to a requirement to manage the biosolids generated at wastewater treatment facilities in Nova Scotia. Research from other jurisdictions that utilize the organic matter and beneficial nutrients contained in biosolids formed the basis of these Guidelines.

Biosolids are primarily organic materials produced during the treatment of domestic sewage and septage sludges, which have been further treated to reduce pathogen content. Due to their nutrient content, biosolids can be applied to land as a fertilizer or soil amendment, a process which is referred to as *land application*. Land application of biosolids can be beneficial by improving crop production and soil properties, reducing requirements for inputs such as fertilizers and irrigation, reclaiming lands (strip mines, quarries, gravel pits, etc.), and enriching forest lands.

Several control mechanisms such as separation distances and biosolids quality criteria have resulted in one of the most stringent biosolids application guidelines in Canada for the protection of human health and the environment.

1.1 Purpose

The purpose of these Guidelines is to:

a) Facilitate the beneficial use of biosolids through land application, while protecting the environment and human health from adverse effects.

b) Provide guidance as to the requirements to obtain an Approval to land apply and/or store biosolids in Nova Scotia.

1.2 Applicability

a) These Guidelines are intended for biosolids produced during the treatment of domestic wastewater or septage, as well as any mixture that contains biosolids.

b) These Guidelines apply to any land which is intended for the application or storage of biosolids.

c) Biosolids that meet the Exceptional Quality (EQ) criteria do not require an Approval for land application. Regular monitoring and sampling of biosolids will be required to ensure that they continue to meet the EQ biosolids criteria.

d) Biosolids that meet the Class A criteria and are regulated by the Canadian Food Inspection Agency (CFIA) under the Fertilizers Act as a fertilizer or supplement do not require an Approval. Regular monitoring and sampling of biosolids will be required to ensure that they continue to meet the Class A biosolids criteria. Proponents shall provide the Department with written verification that the biosolids meet the requirements of the Fertilizers Act.

1.3 Legislation

a) Section 50(2) of the Environment Act, S.N.S. 1994-95, c. 1, reads as follows:

"*No person shall commence or continue any activity designated by the regulations as requiring an Approval, unless that person holds the appropriate approval*".

b) Section 3(1) of the Activities Designation Regulations (O.I.C. 95-286) reads as follows:

"*Any activity designated in these regulations requires an approval from the Minister or an Administrator designated by the Minister*".

c) Section 23 of the Activities Designation Regulations (O.I.C. 95-286) reads:

"*The application to land of non-livestock generated wastes, wastewater and wastewater sludges is designated as an activity*".

d) Section 8(2)(b) of the Environment Act, S.N.S. 1994-95, reads as follows:

Duties of Minister

8(2) *The Minister, for the purposes of the administration and enforcement of this Act, and after engaging in such public review as the Minister considers appropriate, shall*

b) *establish and administer policies, programs, standards, guidelines, objectives, codes of practice, directives and approval processes pertaining to the protection and stewardship of the environment.*

2.0 APPLICATIONS FOR APPROVAL

a) To obtain an Approval to land apply and/or store biosolids in Nova Scotia, a completed application form must be submitted to the Department.

b) More than one land application site can be identified on an Approval. If an Approval holder wishes to add additional land application sites to the Approval, an amendment to the Approval or letter of authorization from the Department is required. Approvals can be valid for up to ten years.

c) Applications must be accompanied by supporting documentation, which must contain all requirements outlined in Schedule 2 of these Guidelines, and must be to the satisfaction of the Department.

3.0 BIOSOLIDS STABILIZATION

Only stabilized biosolids can be applied to land. Stabilization reduces pathogen concentration, helps minimize odour generation, and reduces vector attraction potential. Biosolids may be defined as stabilized if one of the following conditions is met:

a) volatile solids in sewage sludge have been reduced by at least 38% during treatment

b) the specific oxygen uptake rate (SOUR) of the sewage sludge is less than 1.5 mg O_2/hr/g. of total sludge on a dry weight basis corrected to 20 °C. This test is only applicable to liquid aerobic biosolids withdrawn from an aerobic process.

c) sufficient alkaline material has been added to the sewage sludge in order to produce a homogenous mixture with a minimum pH of 12 after 2 hours of vigorous mixing. Facilities adding supplemental alkaline material must maintain the pH of the sludge during interim sludge storage periods.

The following stabilization methods are acceptable to the Department, which are defined in Schedule 1 of these Guidelines: composting, aerobic digestion, anaerobic digestion, alkaline/lime stabilization, heat drying, heat treatment, and pasteurization. Other stabilization methods may be acceptable upon Departmental review and approval.

Biosolids generators are responsible for the stabilization and verification of any biosolids intended for land application. Proponents must provide sufficient information acceptable to demonstrate that the biosolids have been effectively stabilized to meet the pathogen reduction requirements outlined in Table 2.

4.0 BIOSOLIDS QUALITY CRITERIA

Biosolids quality is determined by the pathogen and metal content and is dependent on the wastewater characteristics and the type of treatment. Biosolids acceptable for land application and/or storage in Nova Scotia will fall into one of three categories, depending on the metal and pathogen content: Exceptional Quality (EQ), Class A, or Class B. There are no restrictions for land application of EQ biosolids or biosolids regulated under the Canadian Fertilizer Act, and no Approval is required. However, land application of either Class A or Class B biosolids requires an Approval, and restrictions pertaining to the use of these products will apply.

4.1 Metals

All biosolids contain variable amounts of metals, some of which are essential plant nutrients (micronutrients). When applied to soils in excessive amounts, metals may accumulate in soils. Soil loadings of metals must therefore be controlled in biosolids application. The metal concentration in biosolids intended for land application (EQ or Class A/Class B) must not exceed the *Maximum Acceptable Metal Concentrations* in Table 1.

Table 1: Maximum Acceptable Metal Concentrations in Biosolids (mg/kg of dry weight)

Metal	Exceptional Quality	Class A/Class B
Arsenic	13	75
Cadmium	3	20
Chromium	210	1060
Cobalt	34	150
Copper	400	760
Mercury	0.8	5

Metal	Exceptional Quality	Class A/Class B
Molybdenum	5	20
Nickel	62	180
Lead	150	500
Selenium	2	14
Zinc	700	1850

4.2 Pathogens

Pathogens are disease causing organisms, such as bacteria, viruses, and parasites and exist in all biosolids. The pathogen reduction requirements for each of the three categories of biosolids are listed in Table 2.

Table 2: Pathogen Reduction Requirements

Exceptional Quality	Class A	Class B
Fecal Coliform: <1000 MPN*/g total solids (dry weight) OR Salmonella: <3 MPN*/4g total solids (dry weight)	Fecal Coliform: <1000 MPN*/g total solids (dry weight) OR Salmonella: <3 MPN*/4g total solids (dry weight)	Fecal Coliform: <2,000,000 MPN* per gram of total solids (dry weight)

Note: * MPN (most probable number)

5.0 SITE SELECTION CRITERIA

5.1 Soil Requirements

5.1.1 pH

Soils intended for biosolids application must have a pH between 6.0 and 8.0, to minimize metal leaching. Alkaline stabilized sludges may be applied to soil with a lower pH, provided they will raise the soil pH to at least 6.0 after application of biosolids. The pH of the soil shall be maintained between 6.0 to 8.0 for at least two years following the end of biosolids application.

5.1.2 Metals

Table 3 identifies the Maximum Acceptable Metal Concentrations in Soils. Biosolids must not be land applied if metals in the soil exceed these concentrations. If background metal concentrations in soil exceed the criteria listed in Table 3, land application will be evaluated on a case by case basis.

Table 3: Maximum Acceptable Metal Concentrations in Soils (mg/kg of dry weight)

Metal	Maximum Acceptable Concentrations in Soils
Arsenic	12
Cadmium	1.4
Chromium	64
Cobalt	20
Copper	63
Mercury	0.5
Molybdenum	4.0
Nickel	32
Lead	60
Selenium	1.6
Zinc	200

5.2 Separation Distances

Land application sites for Class A and Class B biosolids must meet or exceed the minimum separation distances identified in Table 4. The separation distances are designed to protect water quality, both surface and groundwater, and human health. These separation distances may be increased at the discretion of the Department.

Table 4 - Minimum Separation Distances (meters)

Type of Feature	Minimum Separation Distance
Public Drinking Water Wells	150 [1]
Private Drinking Water Wells	90 [1]
Property Line	10
Bedrock Outcrops	10
Dwellings	90 [1]
Institutional Buildings (i.e, schools and hospitals)	200 [1]
Commercial buildings	90
Uninhabited Buildings (i.e., sheds, barns, etc.)	30
Public Areas (i.e., parks and playgrounds)	90
Perennial Water Bodies & Watercourses	90 [2]
Intermittent Water Bodies & Watercourses	60 [2]
Swales and Man-Made Drainage Ditches	15
Primary and Secondary Roads	30
Unimproved Dirt Roads	10

Note: 1 - 300 m required for temporary and permanent biosolids storage areas at land application sites

2 - refer to section 5.3 below

5.3 Land Slope

If the sustained slope of the land is less than 3%, the required minimum separation distance between the land application site and the adjacent intermittent and perennial watercourses is as noted in Table 4. However, if the sustained slope of the land is between 3% and 6% the required minimum separation distance between the land application site and adjacent intermittent and perennial watercourses is 125 meters, or if the sustained slope of the land is between 6% and 8% the required minimum separation distance between the land application site and adjacent intermittent and perennial watercourses is 180 meters. If the sustained slope of the land exceeds 8%, land application of Class A or Class B biosolids is not permitted.

5.4 Depth to Groundwater and/or Bedrock

For soils with a lower permeability ($\leq 8x10^{-6}$ m/s) such as clay and silt, biosolids must not be applied to land where the depth to the groundwater table and/or bedrock is less than 1 meter below the soil surface. For soils with a higher permeability ($>8x10^{-6}$ m/s) such as sand and gravel, biosolids must not be applied to land where the depth to the groundwater table and/or bedrock is less than 1.5 meters below the soil surface. For such higher permeable soils, the Department may request additional information regarding the suitability of soil conditions prior to land application being permitted or may require that additional controls be put in place to protect groundwater quality (refer to Section 9.1.3 *Groundwater Quality Monitoring*).

The depth to the water table and/or bedrock can be estimated by excavating test pits. The depth to the water table shall be determined at a time when the water table is at its highest level. The water tables in Nova Scotia typically have peak values in the late Fall and/or late Spring-early Summer. The number of test pits to be excavated across the site is dependent on the size of the application site and topography. Contact the Department prior to excavating the test pits in order to determine the number of test pits required.

5.5 Flood Risk Areas

Additional controls are required when biosolids are applied in flood risk areas. A flood risk area is a flat or gently sloping area beside a watercourse which may be subjected to flooding. The land application of both Class A and Class B biosolids in a flood risk area, which may experience flooding once in 20 years, must not occur before the risk of flood has passed, any flood waters have returned to their normal level, and the soil is adequately drained to support application equipment. Class A and Class B biosolids applied to land within flood risk areas must be directly injected into the soil or surface applied followed by incorporation (within 24 hours of spreading). The storage of Class A or Class B biosolids is not permitted in a flood risk area which may experience flooding once in 100 years.

5.6 Conformity with Municipal By-Laws

Land application and/or storage of biosolids must be in conformity with municipal by-laws. Proponents must obtain any required municipal approval, permit, or other authorization from the local municipality. Applicants must check with municipalities to identify the location(s) of source water protection areas and to determine whether or not land application and/or storage of biosolids is permitted in these areas.

6.0 SITE RESTRICTIONS

6.1 Land Use Restrictions and Waiting Periods

Land on which Class B biosolids have been applied must adhere to the waiting periods identified in Table 5. In addition, Class A and Class B biosolids are not permitted for use on residential lawns and gardens.

Table 5: Minimum Waiting Periods

Land Use	Waiting Period
Pasture	not in the same calendar year
Forage	2 months before harvest
Livestock feed	2 months before harvest
Food crops (edible parts below the soil surface)	38 months before harvest
Food Crops (edible parts above the soil surface)	18 months before harvest
Commercial sod	12 months before harvest

6.2 Signage Requirements for Application Sites

Application sites where Class A and Class B biosolids have been applied require appropriate signage to identify the site as having received biosolids. Signs must be placed at all four corners of the application site as well as on each access road or path into the site. For Class B biosolids signs must remain in place for 38 months following the most recent application. Application sites where Class A biosolids have been applied, temporary signage (2 months) is required. Typical signage shall include the following wording:

Biosolids Application Site

Proponent Name

Identify Biosolids Source(s)

Field No. 1; NE Corner

The signage must be maintained so that it remains in place and can be easily read for the required time period.

7.0 BIOSOLIDS APPLICATION RATE AND METHODOLOGY

7.1 Nutrient and Land Management Plans

Land application of biosolids, when pertaining to agricultural land, shall follow a Nutrient Management Plan or, when pertaining to land other than that used for agricultural purposes, i.e., reclamation sites, a Land Application Plan.

7.1.1 Nutrient Management Plan (NMP)

The nutrient management plan (NMP) shall be prepared by a nutrient management planner and shall outline crop requirements and biosolids parameters (i.e., nutrients and organics). The NMP shall determine the biosolids application rate based on the agronomic rate (biosolids must be applied at a rate that is equal to or less than the agronomic rate). The agronomic rate is the biosolids application rate (on a dry weight basis) that is designed to provide the amount of nutrients that are needed by the crop, while minimizing the amount of nutrients that may leach into the groundwater. Biosolids should be applied as close to the time of maximum nutrient uptake by crops as feasible. The application rate shall ensure that metal concentrations in soils do not exceed the limits specified in Table 3.

7.1.2 Land Application Plan (LAP)

The land application plan (LAP) must be completed by a professional engineer or agrologist. It shall outline crop/vegetation requirements and biosolids parameters (i.e., nutrients and organics), and shall determine application rates based on nutrient and organic matter requirements. The rate of application must ensure that the appropriate amount of nutrients is applied to the soil in order to prevent groundwater contamination. The application rate shall ensure that metal concentrations in soils do not exceed the limits specified in Table 3.

7.2 Acceptable Application Methods

With the exception of flood risk areas, Class A biosolids may be land applied by surface spreading as a top dressing or through incorporation, or by injection below the surface of the soil. Class B biosolids may be surface spread followed by incorporation, or may be injected below the surface of the soil. For Class B biosolids, incorporation must take place within 24 hours of spreading.

For both Class A and Class B biosolids, land application is not permitted when the ground is frozen, snow covered, or saturated. Biosolids must not be applied to land during or immediately following heavy rains or when heavy precipitation is forecasted, which may adversely affect the environment, through surface water run-off, and/or the ability to effectively spread and incorporate the biosolids on the field(s).

8.0 BIOSOLIDS STORAGE

The storage of biosolids may be required at times when land application is not possible, for example, during inclement weather or unsuitable soil conditions. Sufficient storage shall be available to retain biosolids during these circumstances. The storage of Class A or Class B biosolids at land application sites must be approved in writing by the Department.

Class A and Class B biosolids with a minimum solids content of 20% may be stockpiled, or stored temporarily, at the application site prior to land application, provided that the biosolids are intended for use at that location. Biosolids can be stockpiled without an impermeable surface for up to one week at the application site prior to land application, unless otherwise approved in writing by the Department. Stockpiled biosoilds must be fully covered with an impermeable material, such as a tarp. Stockpiles must be located to minimize contact with surface water run-off and to prevent infiltration of precipitation and the generation of leachate. Class A and Class B biosolids with a minimum solids content of 20% may be stored for more than one week on top of an impermeable surface such as a concrete pad or clay liner at the application site prior to land application. The impermeable surface shall have curbed sidewalls or berms on all sides constructed of the same material. Clay liners shall have a minimum thickness of 0.5 meters and an in-situ coefficient of permeability of $1.3x10^{-6}$ cm/sec. Such biosolids storage areas shall be fully covered with an impermeable material, such as a tarp. In addition, such storage areas shall be located to minimize contact with surface water run-off and to prevent infiltration of precipitation and the generation of leachate.

The storage of Class A and Class B biosolids with a solids content of less than 20% must be in lagoons only. Storage lagoons shall be designed by a qualified professional engineer licensed to practice in Nova Scotia and in accordance with the *Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment, and Disposal of Sanitary Sewage*. Biosolids may be stored temporarily (storage of less than 72 hours) in a tank approved by the Department on land application sites.

All biosolids storage must adhere to the requirements outlined in these Guidelines, including separation distances, slope, etc.

9.0 MONITORING, REPORTING AND RECORD KEEPING

9.1 Monitoring

9.1.1 Biosolids Quality

The Approval holder must monitor the quality of the biosolids received from each source. Prior to receipt of biosolids from each source and every 2000 tonnes from each source thereafter, composite biosolids samples shall be collected from each source and analyzed for the parameters identified in Schedule 3 of these Guidelines. All biosolids samples must be collected following a consistent and acceptable sampling procedure, and shall be analyzed by a SCC/CAEAL (Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories) accredited laboratory with the parameters of concern being listed on the laboratory's scope of accreditation.

9.1.2 Soil Quality

The Approval holder must monitor the quality of the receiving soils. Prior to the initial application of biosolids, a composite soil sample must be collected from the application site and analyzed for the parameters identified in Schedule 3 of these Guidelines. Thereafter, following a maximum of five biosolids applications, the application site shall be re-sampled and analyzed for the same parameters. The composite soil sample(s) collected must be representative of the application site, collected following a consistent and acceptable sampling procedure, and shall be analyzed by a SCC/CAEAL (Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories) accredited laboratory with the parameters of concern being listed on the laboratory's scope of accreditation.

9.1.3 Groundwater Quality

Where requested, the Approval Holder shall collect groundwater samples from domestic wells located within 500 meters of the land application and/or storage sites, with the consent of the homeowner. Each well shall be analyzed quarterly for total and fecal coliform and annually for the parameters listed in Schedule 3 of these Guidelines. Where possible, samples shall be collected prior to the initial application of biosolids, and analyzed for the parameters identified in Schedule 3 of these Guidelines, in order to establish baseline data. Following receipt of the sample results, a copy of the analysis shall be provided to the well owner. In addition, the Department may increase the monitoring frequency if necessary.

Where requested by the Department, the Approval holder shall install monitoring well(s) at the application site and/or storage area. These wells shall be monitored annually for the parameters identified in Schedule 3 of these Guidelines. In addition, the Department may increase the monitoring frequency if necessary.

All groundwater samples must be collected following a consistent and acceptable sampling procedure, and shall be analyzed by a SCC/CAEAL (Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories) accredited laboratory with the parameters of concern being listed on the laboratory's scope of accreditation.

9.2 Reporting

Approval holders must submit an annual report to the Department. A detailed list of the information that must be included in each annual report is outlined in Schedule 4 of these Guidelines.

9.3 Record Keeping

The Approval holder must collect, record, and make available, the following information:

- biosolids analysis based on the sampling schedule specified in the Approval
- soil analysis and sample locations, based on the sampling schedule specified in the Approval
- biosolids and soil sampling procedures followed during sample collection
- date and amount of biosolids delivered to each site, the source(s) of these biosolids and any available test results
- land application details for each application site, including the date(s) of application, method(s) of application, and the amount of biosolids applied
- site plan noting where biosolids have been applied to demonstrate compliance with separation distances
- detailed cropping information for each site
- record of complaints and how they were handled
- any other information required or specified in the Approval
- water quality analysis results
- water quality sampling procedures followed during sample collection

The records must be maintained for a minimum period of five years following biosolids application, and must be made readily available to the Department upon request.

10.0 CONTINGENCY PLAN

Applications for Approval for land application and/or storage of biosolids must be accompanied by a contingency plan. The contingency plan shall identify remedial measures to be taken in the event that situations such as biosolids runoff, groundwater and/or surface water impacts, public complaints, and spills are encountered.

11.0 PUBLIC CONSULTATION

Public consultation by the applicant is required. Applications for Approval for land application and/or storage of biosolids must be accompanied by a detailed summary of the public consultation undertaken by the applicant, which shall include the methods utilized, (i.e., public meetings), groups or individuals targeted, feedback received, and how issues or concerns have been addressed. The public consultation shall be representative of the community in which the proposed land application and/or storage of biosolids will take place.

SCHEDULE 1
GLOSSARY OF TERMS

Aerobic Digestion — The degradation of organic matter brought about through the action of micro-organisms in the presence of oxygen for purposes of stabilization, volume reduction, and pathogen reduction.

Agricultural Land — Land on which food, feed, or fibre crops are grown. This includes range land and/or land used as pasture.

Agronomic Rate — the application rate designed to provide the amount of nutrients needed by a crop or vegetation and to minimize the leaching of nutrients into the water table.

Alkaline Stabilization — See "lime stabilization".

Anaerobic Digestion — The degradation of organic matter brought about through the action of micro-organisms in the absence of oxygen for purposes of stabilization, and pathogen reduction.(Mesophilic operating range 35-38 C. Thermophilic operating range greater than 55 C.)

Application Site — See "land application site"

Beneficial Use — Taking advantage of the nutrient content and soil conditioning properties of a biosolids product to supply some or all of the fertilizer needs of an agronomic crop or for vegetative cover (in land reclamation, silviculture, landfill cover, or similar ventures).

Biosolids — An organic, stabilized material produced during the treatment of domestic sewage (some facilities may also receive a commercial and industrial component) and septage sludges. They include the solid, semi-solid, and liquid residue removed from primary, secondary, or advanced wastewater treatment processes, but do *not* include screenings and grit normally removed during the preliminary treatment stages of these processes. These materials must be removed and disposed of in an approved manner. Biosolids must meet the regulations of the jurisdiction in which they are produced or applied. Biosolids differ from sewage and septage sludges in that they have been treated to reduce pathogen content.

Composting — A stabilization process where organic material undergoes biological degradation to a stable end product. Biosolids that has been composted properly is a sanitary, nuisance-free, humus-like material. Approximately 20% to 30% of the volatile solids are converted to carbon dioxide and water. As the organic material in the biosolids decomposes, the compost heats to temperatures in the pasteurization range of 50 to 70°C, and enteric pathogenic organisms are destroyed.

Department — The Nova Scotia Department of Environment and Labour.

Heat Drying — Heat drying of biosolids involves the supply of auxiliary heat to mechanic drying processes in order to increase the vapour holding capacity of the ambient air and to provide the latent heat necessary for evaporation. Temperatures greater than 80°C are required.

Heat Treatment — Heat treatment is a continuous process in which biosolids are heated in a pressure vessel to temperatures up to 260°C for approximately 30 minutes. This serves as both a stabilization process and a conditioning process. It conditions the biosolids by rendering the solids capable of being dewatered without the use of chemicals. When biosolids are subjected to the high temperatures and pressures, the thermal activity releases bound water and results in the coagulation of solids. In addition, hydrolysis of proteinaceous materials occurs, resulting in cell destruction and release of soluble organic compounds and ammonia nitrogen.

Land Application — The spreading of biosolids to any one field following the agronomic rate specified in the nutrient management plan that has been prepared by a qualified nutrient management planner.

Land Application Site — An area of land covered by an Approval on which biosolids are applied to condition the soil, fertilize crops, or promote vegetative growth.

Lime Stabilization — A process in which sufficient lime or other alkaline material is added to biosolids to produce a highly alkaline sludge (pH of 12 after two hours of contact). Also called alkaline stabilization.

Nutrient — Any substance that is required for plant growth. The term generally refers to nitrogen, phosphorus, and potassium in agriculture, but can also apply to other essential and trace elements.

Nutrient Management Planner — A professional Agrologist that has completed appropriate course of study that includes nutrient management planning.

Pasteurization — Biosolids are heated to 70°C for 30 minutes to destroy pathogens.

Pathogens — Organisms such as bacteria, protozoa, viruses, and parasites causing disease in humans and animals. Examples of pathogens that can be present in biosolids are salmonella, coliform, shigella, escherichia coli, hepatitis A virus, rotavirus, polio viruses, cryptosporidium and giardia lamblia. Indicator pathogens are typically used to test for pathogens. Fecal coliform is mainly used as an indicator, however salmonella sp. may also be used.

Separation Distances (Set-backs) — a required minimum distance between the application site and nearby receptors (i.e., humans) and pathways (i.e., drinking water wells and surface water features), designed to protect environmental quality and human health.

Septage Sludge — The solid or semi-solid organic materials removed from septic tanks, holding tanks, vault privies, etc.

Sewage Sludge — The solid, semi-solid, or liquid residue generated during the wastewater treatment process.

Soil amendment — Anything that is added to the soil (i.e., lime, gypsum, inorganic fertilizers and organic material, including biosolids) to improve its physical or chemical condition for plant growth.

Stabilization — Stabilization of biosolids reduces pathogen concentration, helps minimize odour generation, and reduces vector attraction potential.

Vector Attraction — The characteristic of biosolids that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents, such as pathogens.

SCHEDULE 2

SUPPORTING DOCUMENTATION SUBMISSION REQUIREMENTS

As stated in Section 2.0, and pursuant to Section 5(1) of the Approval Procedure Regulations, an application for Approval for land application and/or storage of biosolids must be accompanied by additional supporting documentation, which must contain the following information:

1. Source(s) of biosolids and treatment process
2. Proposed biosolids stabilization method(s)
3. Application method(s)
4. Biosolids quality analysis, including both a summary table, with comparison to the criteria stated in this Guideline, and the laboratory certificates of analysis; samples must be collected and analyzed as per Schedule 3 of these Guidelines
5. Soil quality analysis, including both a summary table, with comparison to the metals stated in these Guidelines, and the laboratory certificates of analysis; samples must be collected and analyzed as per Schedule 3 of these Guidelines
6. A scaled site plan, which identifies the property in question and a minimum of a 1 kilometer radius surrounding the property; the plan shall identify the following:
    - application site(s)
    - existing and proposed biosolids storage areas, if applicable
    - surface water features, including perennial and intermittent water bodies and watercourses, swales, and manmade drainage ditches
    - roads, including primary, secondary, and dirt roads
    - neighboring land uses, including the location of residential areas
    - property boundaries
    - dwellings, schools, churches, businesses, etc.
    - uninhabited buildings
    - drinking water supply wells, both private and municipal, within 500 meters
7. Scaled topographical map
8. Aerial photograph
9. Depth to groundwater and bedrock, and the methods utilized to obtain this data
10. Letter from the local municipality stating that the proposed activity is in conformity with municipal planning regulations/by-laws.
11. If applicable, the construction details of biosolids storage areas. For storage lagoons, a letter from a professional engineer licensed to practice in Nova Scotia stating that the lagoon has been constructed as per these Guidelines is required.
12. Contingency plan
13. Public consultation plan and results

SCHEDULE 3
REQUIRED SAMPLING PARAMETERS

PARAMETER	MEDIUM		
	Biosolids	Soil	Groundwater
moisture content	√		
total coliform (MPN)			√
fecal coliform (MPN)			√
fecal coliform or salmonella (MPN)	√		
alkalinity			√
ammonia			√
arsenic	√	√	√
cadmium	√	√	√
calcium			√
chloride			√
cobalt	√	√	√
conductivity			√
copper	√	√	√
chromium	√	√	√
total organic carbon			√
iron			√
lead	√	√	√
magnesium			√
manganese			√
mercury	√	√	√
molybdenum	√	√	√
nickel	√	√	√
nitrate			√

PARAMETER	MEDIUM		
	Biosolids	Soil	Groundwater
nitrite			√
pH	√	√	√
potassium			√
sodium			√
selenium	√	√	√
sulphate			√
total dissolved solids			√
total kjeldahl nitrogen			√
total phosphorus			√
zinc	√	√	√

SCHEDULE 4
ANNUAL REPORTING REQUIREMENTS

Each year, prior to land application, the Approval holder must submit to the Department an annual report. The report shall contain the following information.

a) The total quantity of biosolids received in the past year, date of receipt, the source(s) of the biosolids, and the quantity of biosolids received from each source

b) Biosolids stabilization method(s)

c) The details of sampling undertaken for biosolids quality (when the sample was collected, how, and by whom), a summary of the analytical results in comparison to the criteria outlined in this Guideline, and the laboratory certificates of analyses

d) A detailed list of all fields or other areas authorized for application or spreading in that calendar year

e) A site plan which identifies the location(s) of biosolids application

f) Biosolids application details for each application site, including the date(s) biosolids were applied, the area to which biosolids were applied, the application rate, and the volume of biosolids applied

g) The details of the soil sampling undertaken on each application site (when the sample was collected, how, and by whom), a summary of the analytical results in comparison to the criteria outlined in this Guideline, and the laboratory certificates of analyses

h) The details of the water sampling undertaken at domestic wells (when the sample was collected, how, and by whom), a summary of the analytical results in comparison the Guidelines for Canadian Drinking Water Quality, and the laboratory certificates of analyses

i) A copy of the nutrient or land management plan

In addition to submission of the annual report, the Applicant must also arrange for a site visit with representatives of the Department.

Biosolids FAQs

Q: What are biosolids?
A: Biosolids, also known as treated sewage sludge, are a primarily organic product produced by wastewater treatment processes. Biosolids are nutrient rich organic material which can be recycled and land applied as a fertilizer or soil amendment. Biosolids must meet the regulations of the jurisdiction in which they are produced or applied.

Q: What is the difference between biosolids and sewage?
A: Sewage is primarily made up of human excrement and wastewater and has not passed through a treatment plant. Anything that is poured down your sink or flushed down your toilet ends up as sewage. Sewage may also include commercial and industrial wastes.

Wastewater treatment plants accept this sewage and treat it through physical, chemical and biological processes. Once treated to acceptable limits, the liquid is returned to the environment. The solid portions, also referred to as sludge, are further treated and stabilized, reducing the potential for pathogens (disease causing organisms)and odours. The treated solid or semi-solid parts generated during the treatment are called **biosolids**.

Q: What does it mean to "stabilize" sludge?
A: Sludge must be processed before it is land applied, this process is referred to as stabilization. There are several methods of stabilization which include: alkaline stabilization, composting, heat drying and digestion. Stabilizing sewage sludge helps minimize odours, reduce pathogen levels, and reduce the potential for vector attraction.

Q: How can biosolids be used?
A: There are three options for the management of biosolids; incineration, landfilling and land application. Each of the management options must follow regulations and guidelines to ensure the protection of the environment.

Q: Will there be an odour when the biosolids are spread on land?
A: When biosolids have been properly treated and managed, odour should not be a problem. Required testing of biosolids from the source and prior to land application helps ensure odours are reduced. However, because biosolids originate from sewage, some people may find the odour offensive depending on their sensitivity. Odours can be reduced when biosolids are spread during favourable weather conditions. Guidelines and best management practices (BMPs) for spreading biosolids, including appropriate separation distances from dwellings and incorporation into the soil, can also prevent any odours from becoming a public nuisance.

Q: Who regulates the land application of biosolids?

A: An individual wishing to apply biosolids to their land must first obtain the appropriate approval from the Nova Scotia Department of Environment and Labour. This approval contains specific terms and conditions that the Approval Holder must follow.

Q: What type of information would an approval for the land application of biosolids include?

A: An approval for the land application of biosolids would include the source of the biosolids, what land is approved for biosolid application, separation distances, and testing requirements for the biosolids and the soil.

A nutrient management plan or a land application plan must be submitted to help determine the amount of biosolids to be applied on each piece of approved land. Sampling of domestic wells within a certain distance of approved sites is required. There are also restrictions on lands that receive biosolids, including sufficient time passing before crops can be grown for human consumption and land used for animal grazing.

Q: What would an approval holder be required to test for?

A: Biosolids must be tested for nutrients, metals, pH, stabilization, and pathogens. Soil from proposed fields for application must also be tested for nutrients, pH and metals before and after the application of biosolids.

Q: Who does the testing?

A: The Approval Holder is responsible for ensuring all required samples are collected and analyzed at a certified laboratory.

Q: How can biosolids help crops grow?

A: Biosolids contain macro-nutrients (nitrogen and phosphorus) as well as micro-nutrients (zinc, calcium, copper and magnesium), which are all important for plant growth. Biosolids also contain organic matter which can improve the soil structure, reducing surface runoff and soil erosion. When managed properly, land application of biosolids recycles valuable nutrients while helping improve crop production and reducing the need for chemical fertilizers.

Q: Is land application of biosolids safe?

A: When proper guidelines and regulations are followed, the use of biosolids presents negligible risk to the consumer, to crop production and to the environment.

Q: How are the biosolids applied to land?

A: Biosolids can be applied to land using methods that are similar for manure application. Biosolids can be injected into the soil, surface applied, or surface applied and incorporated, depending on the type of land and the consistency of the biosolids.

Q: Is it safe to eat food that was grown on soil where biosolids were applied?

A: There are time restrictions with the application of biosolids that must be followed when dealing with crops grown for animal and human consumption. When biosolids are managed according to guidelines, there are negligible risks.

Q: Are there metals in the biosolids?
A: Yes. Trace metals, such as lead, copper and zinc, can enter wastewater from industrial drains and metal pipes from homes and businesses. In small amounts these metals are actually required for plant growth and can improve crop yields. Regular testing of metals in soils and in biosolids prevents levels from exceeding guidelines which could contaminate the soil.

Q: Are there any other pollutants that are a concern when dealing with biosolids?
A: Organic compounds, such as pesticides, solvents and polycholorinated biphenyls (PCBs) can be found in biosolids at concentrations near the lowest detectable limits. However, studies have found risks associated with these pollutants to be extremely low.

Q: How will I know if biosolids have been spread in any areas around my home?
A: As part of the approval process the proponent must inform the general public of the proposal to land apply biosolids. This may be in the form of an advertisement in your local newspaper or through open house presentations. Signs will also be posted on any application sites that have received biosolids.

Q: Can the groundwater and surface water be affected?
A: Terms and Conditions of an approval reduce the potential risk to groundwater and surface water quality and protect the water from becoming contaminated by biosolids. The recommended application rates are based on nutrient and metal content in soils and in the biosolids. There are also restrictions on location, type and timing of application of biosolids that limit the risks that biosolids may pose to our water supplies.

Q: What is the difference between Exceptional Quality, Class A and Class B biosolids?
A: The quality of biosolids is determined by the presence of pathogens and metal content. Exceptional Quality and Class A biosolids have the same requirements for pathogen levels, but Exceptional Quality has stricter limits for metal content. Class A and Class B biosolids have the same requirements for metal content, but Class A has stricter limits for pathogen levels.

Q: How long has the practice of land application of biosolids been around?
A: Throughout Canada and internationally, biosolids have been applied to agricultural land for more than 40 years. As municipalities throughout the province continue to construct improved wastewater treatment facilities, greater quantities of biosolids will be produced, creating a greater need for the proper management of biosolids.